



WATER RESOURCES RESEARCH GRANT PROPOSAL

Title: *In Situ* Measurement of Denitrification in Agricultural Streams

Focus Category: NC, NPP, MET

Keywords: denitrification, agriculture, surface drainage, isotopes

Duration: 9/2000 to 8/2002

Federal Funds Requested: \$89,930

Non-Federal (Matching) Funds Pledged: \$90,000

Principal Investigators :

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Congressional District: 5

Abstract:

Nitrate contamination of ground water and streams is common in landscapes dominated by agricultural activities. Associated impacts of this pollution range from local violations of drinking water standards designed to prevent methemoglobinemia to national (e.g., Gulf of Mexico hypoxia). Significant quantities of nitrate are exported from agricultural lands through drainage ditches and low-order natural streams, but our understanding of nitrogen transport and transformation in these agricultural streams is far from complete. Denitrification may be an important mechanism for nitrate removal in these streams, mitigating water quality and health hazards downstream. Several methods can be used to measure denitrification, but the most common ones involve laboratory experiments with sediment cores, where conditions are not conducive to obtaining *in situ* rates. *Our main objective is to assess in situ denitrification rates in agricultural streams, and determine how these rates vary with stream stage, flow, and temperature.* We will compare *in situ* results obtained by acetylene blockage, ^{15}N tracer, ^{15}N natural abundance ratios, and mass balance methods. Part of our fieldwork will use in-stream mesocosms for assessments. We will measure loss rates over a range of discharge and stage and make a preliminary assessment of the usefulness of artificial stream level manipulations to enhance denitrification. Field work will be conducted in the eastern Minnesota River Basin, an agricultural area with very high nitrate levels in its streams and rivers. A first-order stream near Waseca, MN, and four orders of streams in the Sand Creek system (near Jordan, MN) will be studied. The Waseca stream is adjacent to a 200-ha drainage research facility operated by the University of Minnesota.